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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/976,641	10/12/2001	Daniel Xu	INTO-0004-US	2057

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Timothy N. Trop
TROP, PRUNNER & HU, P.C.
8554 KATY FWY
SUITE 100
HOUSTON, TX 77024-1805

EXAMINER	
BAUMEISTER, BRADLEY W	

ART UNIT	PAPER NUMBER
2815	14

DATE MAILED: 04/16/2003

Remailed

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)
09/976,641	Xu et al.
Examiner	**Art Unit**
B. William Baumeister	2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *Jan 14, 2003*.

2a) ☒ This action is **FINAL.** 2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above, claim(s) *1-10* is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *11-30* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____
4) ☐ Interview Summary (PTO-413) Paper No(s). _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 U.S.C. § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 11, 12 and 16-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ovshinsky '205 in view of Chang '995.

a. Ovshinsky discloses a memory storage array employing phase-change memory material and includes the following structures (see e.g., FIG. 1 and cols. 15-16): a p-type semiconductor substrate 10 (unnumbered in FIG 1); a plurality of buried n+ channels (wordlines) 12 that couple various memory cells (see e.g., FIG 3); an n epitaxial layer 14; isolation trenches 16 on either side of each of the buried lines 12; p+ diffusion layer 24; SiO2 insulation layer 20 having a plurality of apertures (or pores) 22; metal contact 32; memory material 36 having a lower portion which extends into the insulation pores 22; and upper contact 40. Restated, Ovshinsky discloses all of the limitations of the listed claims except for the presence of a lightly doped n-type region interposed between the n+ wordline 12 and the p-type substrate, and that the diode structure may be formed in a bulk substrate as opposed to a bulk/epi substrate.

b. Chang is directed towards a ROM diode array having n+ conductive lines 32 diffused into a p-type bulk substrate 20 with a p+ regions 40 diffused, in turn, into the n+ conductive lines 32 to form the memory diode. Chang further teaches that additional, more lightly doped n-diffusion regions 38 are formed under the n+ conductive lines 32 for the purpose of preventing current leakage between the n+ conductive lines 32 and the p-substrate 20 (e.g., col. 4, lines 10-). It would have been obvious to one of ordinary skill in the art at the time of the invention to have further included additional, more lightly doped n-type regions between the n+ channel and p-substrate of the Ovshinsky memory device for the purpose of reducing current leakage as taught by Chang.

c. The previously added language to the independent claims sets forth that the substrate is a bulk substrate, thus distinguishing the structure from a pn diode that is formed in/on a bulk substrate as well as an epitaxial layer formed on the bulk substrate, as taught by Ovshinsky. Chang teaches that pn diodes can alternatively be formed exclusively in bulk substrates without the inclusion of an epi layer, as opposed to in bulk regions and epi regions of a substrate. It would have been obvious to one of ordinary skill in the art at the time of the invention to have formed all of the pn diode's bulk and epi regions as taught by Ovshinsky/Chang solely in a bulk substrate without growing an epilayer, as taught by Chang for the purpose of simplifying the manufacturing process and thereby reducing the associated manufacturing costs.

d. Claim 20 further recites that the pore is lined with a sidewall spacer. The Examiner notes that under the broadest reasonable interpretation, the term "sidewall spacer"

relates to the method by which the insulation layer and aperture is formed, and nothing in the claim precludes the sidewall spacer from being formed of the same material as that of the insulating layer. As such, because SiO2 is an amorphous material with no long-range grain boundaries, there is no structural distinction between calling the entire SiO2 layer an insulation layer, or alternatively labeling a portion of the SiO2 as an insulation layer and another portion as a sidewall spacer. Restated, as the portion of SiO2 adjacent the pore forms a sidewall and spaces the pore and its contents from the rest of the insulation layer 20, this adjacent portion can be labeled a sidewall spacer, so the Ovshinsky reference also teaches the language of this claim.

e. Regarding claim 23, in that Ovshinsky is directed towards a digital memory array, and such arrays' primary (if not only) intended use is for storing electronic data in a machine that manipulates digital data (i.e., a computer), it would have been obvious to one of ordinary skill in the art at the time of the invention that the Ovshinsky memory device may be used in a computer for the purpose of using it for its intended purpose, regardless of whether Ovshinsky expressly, implicitly or inherently teaches as much.

f. Regarding claim 24, Ovshinsky further discloses (see e.g., FIG 4 and col. 19) an addressing matrix (interface) 52 and integrated circuitry connections (bus) 53 coupled to the storage array 51. Further, regardless of whether Ovshinsky expressly discusses the presences of a processor, one would inherently be present in the computer and coupled to the storage so that the storage will work for its intended purpose of storing memory that is to be processed by a processor.

3. Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ovshinsky/Chang as applied to claim 12 above, and further in view of Holmberg et al. '705. As explained above Ovshinsky/Chang teaches all of the limitations of claim 12 and also those limitations set forth in claims 14 and 15, but does not teach that the contact is formed under the dielectric layer as recited in claim 13. Rather, Ovshinsky teaches that metal contact 32 is formed in and over the dielectric pore and layer.

a. Holmberg et al. '705 is directed towards a programmable memory array having buried n+ wordline 56 formed on a p-type substrate 54 under n-type region 64 with a chalcogenide phase-change based memory structure formed thereover. The lower platinum silicide memory electrode 60 is formed under the insulation layer 66 and aligned with the insulation pore. It would have been obvious to one of ordinary skill in the art at the time of the invention to have employed the electrode-under insulation structure as taught by Holmberg in the memory device of Ovshinsky at least for the purpose of not taking up addition space in the insulation pore, thereby enabling the pore to be formed of a smaller diameter and, in turn, enabling further miniaturization of the memory array.

b. Regarding claim 14, regardless of whether either of Ovshinsky or Holmberg expressly state that the function of the upper more lightly doped n-region (e.g., Ovshinsky's n epi region 14) is to reduce the reverse bias leakage of the n+ line, the underlying physics of carrier behavior in doped semiconductor junctions dictates that this function will necessarily result due to the presence of the lightly doped n-type layer.

Response to Arguments

4. Applicant's arguments filed 1/14/2003 have been fully considered but they are not persuasive.

a. Applicant has argued that Ovshinsky does not include the buried line or the region of second conductivity type in the bulk substrate. As was previously explained, Ovshinsky teaches a substrate that includes a bulk p-type portion and an overlying epitaxially-grown portion. These two substrate portions do, in fact, include all of the limitations that were discussed previously. Further, the Examiner has previously set forth--under the assumption for the sake of argument that a substrate composed of a bulk portion and an epitaxially-grown portion is structurally distinguishable from a bulk substrate--why it would have been obvious to form the relevant regions contained in Ovshinsky's bulk-epi substrate structure alternatively exclusively in a bulk substrate structure. See paragraph 2c above.

b. Applicant has asserted that "the Examiner contends that Chang teaches a buried line." (REMARKS, page 2, second paragraph). The Examiner notes for the record that Chang does teach a line (region 40) as was explained, but the Examiner never asserted that the Chang line is buried. Rather, Ovshinsky teaches that line 12 is buried within the bulk-epi substrate.

c. Applicant has argued that none of the references teach a more lightly doped region disposed above the buried line. The Examiner agrees that Chang does not teach this feature. However, as was explained, Ovshinsky does teach this (n-epi region 14). As such, Chang was not combined with Ovshinsky to teach the inclusion of the more lightly doped region *above* the word

line. Rather, Chang was combined to teach the use of a more lightly doped region below the heavily doped line and for the teaching that diodes can be formed exclusively in bulk substrates as an alternative to being formed in bulk-epi substrates.

d. Applicant has argued, "there is nothing in Ovshinsky to anyway suggests that anything he was doing was designed to reduce leakage current. In fact he did nothing to reduce leakage current. Therefore to suggest that Ovshinsky could be reconfigured in some way to solve a problem he never recognized is certainly the epitome of hindsight reasoning." As was explained, Ovshinsky does teach the presence of the more lightly doped region 14 over buried line 12. Whether expressly recited or not, the presence of this structure does reduce leakage current. Further, Ovshinsky is not being reconfigured to include this *overlying* more lightly doped region. It is already there. Ovshinsky is being modified to include a more lightly doped region *below* the wordline. This modification and motivation to employ it are both taught by Chang as was explained.

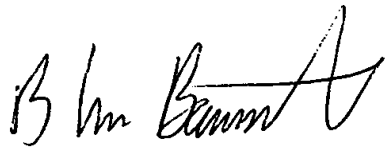
e. Applicant has argued that Ovshinsky does not teach a sidewall spacer as required by claim 20. The Examiner already explained that under the broadest reasonable interpretation, a sidewall spacer reads on a structure that is composed of the same amorphous material as that of the adjacent insulating layer. As such, the language only sets forth the process by which the spacer was made but does not further structurally distinguish over a single amorphous insulating layer. The following case law makes clear that in claims directed towards a product, it is the patentability of the final product *per se* which must be determined, no matter how actually made.

Further, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims ***or otherwise***. *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See also, *In re Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wethheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); *In re Marosi et al.*, 218 USPQ 289; and particularly *In re Thorpe*, 227 USPQ 964. **Note that in such cases, the burden is on applicant to prove that claim language relating to the method of making the device results in a structural difference over the prior art. If Applicant wishes to preclude the claimed sidewall spacer from reading on the edge portion of Ovshinsky's insulating layer 20, Applicant should further limit the claim such that the device includes a dielectric layer (e.g., 30, Applicant's FIG 1) and a sidewall spacer (36) that is composed of a material that is different from that of the dielectric layer (presuming the specification supports this language).**

f. Accordingly, the rejections are still deemed to be proper and are maintained.

INFORMATION ON HOW TO CONTACT THE USPTO

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to the examiner, **B. William Baumeister,** at **(703) 306-9165.** The examiner can normally be reached Monday through Friday, 8:30 a.m. to 5:00 p.m. If the Examiner is not available, the Examiner's supervisor, Mr. Eddie Lee, can be reached at (703) 308-1690. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.



B. William Baumeister

Patent Examiner, Art Unit 2815

March 1, 2003

UNITED STATES
PATENT AND
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Commissioner for Patents
Washington, DC 20231
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FEB 20 2003

Dear Patent Business Customer:

The United States Patent and Trademark Office ("Office") is now permitting and encouraging applicants to voluntarily submit amendments in a revised format as set forth in *AMENDMENTS IN A REVISED FORMAT NOW PERMITTED*, ____ *Off. Gaz. Pat. Office* __ (February 25, 2003), currently available on the USPTO web site at **http://www.uspto.gov/web/offices/pac/dapp/opla/preognotice/revamdtprac.htm**. The revised format permits amendments to the specification and claims to be made in a single marked-up version; the requirement for a clean version is eliminated. Attached, you will find a flyer with information and instructions regarding the procedures to be used to comply with the revised format. The flyers are being inserted with out-going Office actions mailed during the period of February 20, 2003 - March 31, 2003.

The revised amendment format is essentially the same as the amendment format for the specification, claims, and drawings that the Office is considering adopting via a revision to 37 CFR 1.121 (Manner of Making Amendments). The revision to 37 CFR 1.121 (if adopted) will simplify amendment submission and improve file management. This proposed revision and others necessary to facilitate a gradual transition to the use of an Electronic File Wrapper (EFW) will be set forth in a Notice of Proposed Rule making (NPR), expected to be published by March 2003. After consideration of public comments, the Office anticipates adopting a revision to § 1.121, following publication of a Notice of Final Rule making (NFR), expected by June 2003, at which point compliance with revised § 1.121 will be mandatory.

The Office will continue to accept your amendment submissions in the revised format during the voluntary period, which will extend up to the effective date of final revisions to § 1.121. The Office also encourages your feedback on the proposed revised amendment format and other changes set forth in the NPR, expected to be published by March 2003.

For assistance: Any questions regarding the submission of amendments pursuant to the revised practice should be directed to Office of Patent Legal Administration (OPLA), Legal Advisors Elizabeth Dougherty (**Elizabeth.Dougherty@uspto.gov**), Gena Jones (**Eugenia.Jones@uspto.gov**) or Joe Narcavage (**Joseph.Narcavage@uspto.gov**). Alternately, you may send e-mail to "Patent Practice", the OPLA e-mail address that has been established for receiving queries and questions about patent practice and procedures or telephone OPLA at (703) 305-1616.

Nicholas P. Godici

Nicholas P. Godici
Commissioner for Patents

Attachment: Flyer entitled: *Revised Notice* AMENDMENTS MAY NOW BE SUBMITTED IN REVISED FORMAT*

(4) A claim may be canceled by merel -oviding an instruction to cancel. Listing - -laim as canceled will constitute an instruction to cancel. -ny claims added by amendment must be i- -cated as (new) and shall not be underlined.

(5) All of the claims in each amendment paper must be presented in ascending numerical order. Consecutive canceled or withdrawn claims may be aggregated into one statement (e.g., Claims 1 – 5 (canceled)).

Example of listing of claims (use of the word "claim" before the claim number is optional):

Claims 1-5 (canceled)

Claim 6 (withdrawn)

Claim 7 (previously amended): A bucket with a handle.

Claim 8 (currently amended): A bucket with a ~~green~~ blue handle.

Claim 9 (withdrawn)

Claim 10 (original): The bucket of claim 8 with a wooden handle.

Claim 11 (canceled)

Claim 12 (re-presented – formerly dependent claim 11) A black bucket with a wooden handle.

Claim 13 (previously added): A bucket having a circumferential upper lip.

Claim 14 (new): A bucket with plastic sides and bottom.

B) Amendments to the specification:

Amendments to the specification must be made by presenting a replacement paragraph or section marked up to show changes made relative to the immediate prior version. An accompanying clean version is not required and should not be presented. If a substitute specification is being submitted to incorporate extensive amendments, both a clean version (which will be entered) and a marked up version must be submitted as per current 37 CFR 1.125.

C) Amendments to drawing figures:

Drawing changes must be made by presenting replacement figures which incorporate the desired changes and which comply with § 1.84. An explanation of the changes made must be presented in the remarks section of the amendment. Any replacement drawing sheet must include all of the figures appearing on the immediate prior version of the sheet, even though only one figure may be amended. The figure or figure number of the amended drawing should **not** be labeled as "amended." If the changes to the drawing figure(s) are not accepted by the examiner, applicant will be notified of any required corrective action in the next Office action. No further drawing submission will be required, unless applicant is notified.

Any questions regarding the submission of amendments pursuant to the revised practice set forth in this flyer should be directed to the following legal advisors in the Office of Patent Legal Administration (OPLA): Elizabeth Dougherty (Elizabeth.Dougherty@uspto.gov), Gena Jones (Eugenia.Jones@uspto.gov) or Joe Narcavage (Joseph.Narcavage@uspto.gov). For information on the waiver or legal aspects of the prototype, please contact Jay Lucas (Jay.Lucas@uspto.gov), Senior Legal Advisor (PCTLA) or Rob Clarke (Robert.Clarke@uspto.gov), Senior Legal Advisor (OPLA). Alternatively, further information may be obtained by calling OPLA at (703) 305-1616.

* Revised Notice: See Sec. B) for changes relating to substitute specifications, and Sec. C) for changes on replacement drawing practice.